

Aliens ‘R Us: The Ten Errors of Science Fiction

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In all works of science fiction, there are ten hidden assumptions regarding alien races. None of these assumptions is a necessity. None of them makes immanent or inevitable sense. Yet, when we read a sci-fi novel or watch a sci-fi movie we tend to accept all of them as inescapable. They amount to a frame of reference and to a language without which we seem to be unable to relate to all manner of exobiology. We evidently believe that life on Earth is a representative sample and that we can extrapolate its properties and mechanisms of action wide and far across the Universe. The principles of symmetry, isotropy, and homogeneity apply to the physical cosmos: Hydrogen behaves identically in our local galactic neighbourhood as it does in the furthest reaches of the Cosmos. Why shouldn't life be the same?

Which leads us to the first fallacy:

1. Life in the Universe

Alien beings may not be alive in any sense of this ambiguous and loaded word. They may not eat, drink, excrete, reproduce, grow, die, process information, or move. Even here, on Earth, we have examples of such entities (viruses, for instance). Why assume that extrasolar creatures must be endowed with a biology of some kind?

But isn't life as we know it an unavoidable outcome of the growing complexity of organisms? This is begging the question. Multi-cellular entities on Earth are manifestations of Carbon-based biology. We cannot imagine beings whose complexity does not spring from some material (or energy) lattice. But our inability to imagine something, even in principle, is no proof that it cannot or does not exist.

2. The Concept of Structure

Aliens in science fiction are typically anthropomorphic in body and in psyche. They sport a central trunk out of which protrude extremities and a head that rests on a variant of our neck. They possess and are possessed by emotions. They reason and debate exactly as we do. The rare few who bear no resemblance to Homo sapiens are usually pure energy. But, even these are arranged in a matrix that is in principle visible or otherwise measurable. We cannot conceive of entities that completely lack organisation.

Yet, structure and organization are mere language elements. They are “in our head” so to speak. They do not exist in reality. They are the results of our limitations: our inability to grasp the whole at once. We use time, space, and form to cope with the immense amount of information that constitutes the Universe. Our minds slice the world and shape it into manageable bits that can be classified and catalogued. We then postulate the existence of interactions to account for our sense of inexorable time. Other inhabitants of the Cosmos may be completely shapeless, lack boundaries or size, be devoid of structure, and be totally inert.

But isn't structure a precondition for complexity? The answer is a resounding no (see my article “[The Complexity of Simplicity](#)”). Additionally, why assume that sentient beings must

be complex? Complexity is one solution. Simplicity is another. Our evolution “chose” the former. Processes in other corners of the Galaxy may prefer the latter.

Even the concept of “race” or “species” is doubtful. Why would aliens have to belong to such taxonomic categories? Why can’t we imagine a group of astrobiological specimen, each one constituting a distinct species, *sui generis*, “custom-made”? Why presume that they all must share the same genetic heritage? For that matter, why should they have a genetic make-up at all? Is our DNA the most efficient method of propagating data across time? This is an extremely chauvinistic supposition.

3. Communication and Interaction

Slaves to our (false) sensation of [time](#), we deny the possibility of simultaneity and require that information travels a finite distance in any given period. This precondition requires us to communicate and interact in order to affect changes in our environment and in our interlocutors: we are forced to transfer and transport information by a variety of means from one point in spacetime to another.

Certain sci-fi works introduce “[telepathy](#)” into their imaginary worlds: the instant evocation of content in one mind by another’s brain acting on it. But telepathy still assumes some kind of transport mechanism and the separateness of sender and recipient in space and, sometimes in time. No matter how imaginative and creative our literary and scientific endeavours, we are unable to convincingly describe a truly timeless, eventless ecosystem where things don’t happen and information is immediately available everywhere, vitiating the need for communication and interaction.

Yet, [modern Quantum Mechanics](#) provides us with exactly this insight: that time and space are illusions, linguistic conventions that are the outcomes of our idiosyncratic (not to say inferior) mental apparatus. The foundations of our reality at the particle level are such that simultaneity is common (entanglement) and even the concept of location is gravely challenged (the Uncertainty Principles; tunnelling and other quantum phenomena). Superior beings may not have to communicate or interact at all.

4. Location

In sci-fi works, aliens are always somewhere, in a given location. Granted, some of them project their image. Others can be in multiple places at the same moment or be part of a colony-like hive. But all extraterrestrial life forms occupy space and time and can be pinpointed to a reasonable degree using scientific instrumentation or human sense organs.

Yet, location – like space and time themselves – is a mere convention. At the particle level, knowing one’s location is a tricky business as it precludes information about other properties of the object being observed. Embryonic quantum machines and quantum computers already make use of this fact: that the building blocks of our world cannot be effectively located in either space or time (a phenomenon known as [entanglement](#)).

ET may not have a “home”. His “place” may be everywhere and nowhere at the same “time”. We can’t wrap our head around these possibilities because our cerebral computer comes equipped (at least according to Kant) with software that limits us to its parameters and

procedures. Moreover: location is an essential component of our sense of identity and individuality.

5. Separateness

It is impossible for us to deny our separation – physical, temporal, and psychological - from other people. We are individuals with a specific mindset, needs, fears, emotions, priorities, personal history, wishes, and place in the world. Our language is ill-equipped to cope with a different reality. We cannot conceive of sharing a body – let alone a mind - with someone else. Even when we discuss multi-organism coordinated and directional hyperstructures, such as ant or bee colonies, we still distinguish between the components comprising them in terms of individuals. We (at least in the West) insist that we not illusory manifestations of an underlying and more fundamental whole.

Yet, as Eastern philosophy and modern physics tell us our separateness may indeed be nothing more than an illusion, a convenient organizing principle and an operational unit, akin to the cell in a human body. Aliens may have long discarded such amenity, if they availed themselves of it to start with. Non-terrestrials may have dispensed with the notions of individuals and separateness, [“whole” and “parts”](#) and may have supplanted them with the – to us – unimaginable.

6. Transportation

If location and separateness are deceptive, what need there is of transportation? Of what use are spaceships? Even if location and separateness are real, why would advanced species need to travel anywhere? Why not simply project themselves or induce action at a distance? We don't travel to our bank – we use online banking. We remote control our televisions, power stations, cranes, and numerous other machines. We videoconference. Why reduce supposedly superior races to the travails of physical, galaxy-hopping missions? The classical answer is: in order to manipulate the environment and control it one needs to be physically present there. But why presuppose that Aliens are interested in manipulating or controlling their surroundings (nature)? Even more fundamentally: why think that Aliens have a will at all?

7. Will and Intention

In all sci-fi works, extraterrestrials want something, desire it, or wish for it. They form intentions and act directionally to achieve their goals. These literary devices pose two related problems: (a) we cannot be sure that the actions of alien beings signify – let alone prove – the existence of volition; and (b) we cannot be sure that aliens lack will and intent even if they do not act at all. Put concisely: actions teach us nothing about the existence or absence of intelligence, volition, intent, planning, foresight, and utilitarian thinking. We don't know if and cannot prove that animals (such as pets) are possessed of a will even when they are acting wilfully. Imagine how much more difficult it would be with visitors from outer space. Attributing will and directionality to ET is a prime example of [teleology](#) (the belief that causes are preceded by their effects) and anthropomorphism (attributing human qualities, motives, emotions, and conduct to non-humans).

Throughout this discussion, it would seem that a goal necessarily implies the existence of an intention (to realize it). A lack of intent leaves only one plausible course of action:

automatism. Any action taken in the absence of a manifest intention to act is, by definition, an automatic action.

The converse is also true: automatism prescribes the existence of a sole possible mode of action, a sole possible Nature. With an automatic action, no choice is available, there are no degrees of freedom, or freedom of action. Automatic actions are, ipso facto, deterministic.

Still, the distinction between volitional and automatic actions is not clear-cut.

Consider, for instance, house pets. They engage in a variety of acts. They are goal oriented (seek food, drink, etc.). Are they possessed of a conscious, directional, volition (intent)? Many philosophers argued against such a supposition. Moreover, sometimes end-results and by-products are mistaken for goals. Is the goal of objects to fall down? Gravity is a function of the structure of space-time. When we roll a ball down a slope (which is really what gravitation is all about, according to the General Theory of Relativity) is its "goal" to come to a rest at the bottom? Evidently not. Natural processes are considered to be witless reactions. No intent can be attributed to them because no intelligence can be ascribed to them. Yet, this is true but only at times.

8. Intelligence

We cannot safely deduce that Aliens are intelligent from merely observing their behaviour. It is a fallacy to insist that technology and collaboration are predicated on intelligence. Even on Earth, with a limited sample of Life, we have examples of directional (goal-oriented) and technology-empowered behaviour by non-sentient entities (computers, for instance). Intelligence as we understand it requires [introspection and self-awareness](#) and, probably a concept of "self" (see item 5 above: "Separateness").

Still, Aliens – like us – are part of Nature. Is Nature as a whole intelligent (as we humans understand intelligence)? Was it designed by an intelligent being (the "watchmaker" hypothesis)? If it was, is each and every part of Nature endowed with this "watchmaker" intelligence?

Intelligence is hard to define. Still, the most comprehensive approach would be to describe it as the synergetic sum of a host of mental processes (some conscious, some not). These mental processes are concerned with information: its gathering, its accumulation, classification, inter-relation, association, analysis, synthesis, integration, and all other modes of processing and manipulation.

But is this manipulation of information not what natural processes are all about? And if nature is the sum total of all natural processes, aren't we forced to admit that nature is (intrinsically, inherently, of itself) intelligent? The intuitive reaction to these suggestions is bound to be negative. When we use the term "intelligence", we seem not to be concerned with just any kind of intelligence - but with intelligence that is separate from and external to what has to be explained. If both the intelligence and the item that needs explaining are

members of the same set, we tend to disregard the intelligence involved and label it as "natural" and, therefore, irrelevant.

Moreover, not everything that is created by an intelligence (however "relevant", or external) is intelligent in itself. Some automatic products of intelligent beings are inanimate and non-intelligent. On the other hand, as any Artificial Intelligence buff would confirm, automata can become intelligent, having crossed a certain quantitative or qualitative level of complexity. The weaker form of this statement is that, beyond a certain quantitative or qualitative level of complexity, it is impossible to tell the automatic from the intelligent. Is Nature automatic, is it intelligent, or on the seam between automata and intelligence?

Nature contains everything and, therefore, contains multiple intelligences. That which contains intelligence is not necessarily intelligent, unless the intelligences contained are functional determinants of the container. Quantum Mechanics (rather, its Copenhagen interpretation) implies that this, precisely, is the case. Intelligent, conscious, observers determine the very existence of subatomic particles, the constituents of all matter-energy. Human (intelligent) activity determines the shape, contents and functioning of the habitat Earth. If other intelligent races populate the universe, this could be the rule, rather than the exception. Nature may, indeed, be intelligent in the sense that it is determined by the intelligent races it contains.

Indeed, goal-orientated behaviour (or behavior that could be explained as goal-orientated) is Nature's hallmark. The question whether automatic or intelligent mechanisms are at work, really deals with an underlying issue, that of consciousness. Are these mechanisms self-aware, introspective? Is intelligence possible without such self-awareness, without the internalized understanding of what it is doing?

9. Artificial vs. Natural

Sci-fi authors sometimes suggest or state that "their" Aliens are natural beings, not machines or artificial entities. They tout the complexity of these life forms to prove that they have emerged naturally and are intelligent. In the apocalyptic works that depict a takeover of Earth by man-made or extraterrestrial automata, the marauders or invaders are described as artificial and, therefore, simpler than the natural species that they are challenging. In many respects, these devices are not intelligent.

Conflating the natural with the complex and the intelligent is wrong, however.

Indeed, complexity rises spontaneously in nature through processes such as self-organization. Emergent phenomena are common as are emergent traits: both are not reducible to basic components, interactions, or properties. Yet, complexity does not indicate the existence of a designer or a design. Complexity does not imply the existence of intelligence and sentient beings. On the contrary, complexity usually points towards a natural source and a random origin.

It is also true that complexity and artificiality are often incompatible. Artificial designs and objects are found only in unexpected ("unnatural") contexts and environments. Natural objects are totally predictable and expected. Artificial creations are efficient and, therefore, simple and parsimonious. Natural objects and processes are not.

As Seth Shostak notes in his excellent essay, titled "[SETI and Intelligent Design](#)", evolution experiments with numerous dead ends before it yields a single adapted biological entity. DNA is far from optimized: it contains inordinate amounts of junk. Our bodies come replete with dysfunctional appendages and redundant organs. Lightning bolts emit energy all over the electromagnetic spectrum. Pulsars and interstellar gas clouds spew radiation over the entire radio spectrum. The energy of the Sun is ubiquitous over the entire optical and thermal range. No intelligent engineer - human or not - would be so wasteful.

10. Leadership

Finally and perhaps the most preposterous aspect of the vast majority of the sci-fi oeuvre is the imposition of human social structures and predilections on our galactic roommates. They all seem to have leaders, for instance. Yet, even on Earth we have numerous examples of life forms with no leadership or hierarchy and in which decision-making is decentralized in a kind of parallel processing (consider bacteria and plants for instance). Why do all extraterrestrial species resemble the Nazi party is beyond me.

1. The Six Arguments against SETI

The various projects that comprise the 45-years old Search for Extraterrestrial Intelligence (SETI) raise two important issues:

- (1) Do Aliens exist and
- (2) Can we communicate with them?

If they do and we can, how come we never encountered an extraterrestrial, let alone spoken to or corresponded with one?

There are six basic explanations to this apparent conundrum and they are not mutually exclusive:

- (1) That Aliens do not exist - *click [HERE](#) to read the response*
- (2) That the technology they use is far too advanced to be detected by us and, the flip side of this hypothesis, that the technology we use is insufficiently advanced to be noticed by them - *click [HERE](#) to read the response*
- (3) That we are looking for extraterrestrials at the wrong places - *click [HERE](#) to read the response*
- (4) That the Aliens are life forms so different to us that we fail to recognize them as sentient beings or to communicate with them - *click [HERE](#) to read the response*

(5) That Aliens are trying to communicate with us but constantly fail due to a variety of hindrances, some structural and some circumstantial - *click [HERE](#) to read the response*

(6) That they are avoiding us because of our misconduct (example: the alleged [destruction of the environment](#)) or because of our traits (for instance, our innate belligerence) or because of ethical considerations - *click [HERE](#) to read the response*

Argument Number 1: Aliens do not exist (the Fermi Principle)

The assumption that life has arisen only on Earth is both counterintuitive and unlikely. Rather, it is highly probable that life is an extensive parameter of the Universe. In other words, that it is as pervasive and ubiquitous as are other generative phenomena, such as star formation.

This does not mean that extraterrestrial life and life on Earth are necessarily similar. Environmental determinism and the panspermia hypothesis are far from proven. There is no guarantee that we are not unique, as per the Rare Earth hypothesis. But the likelihood of finding life in one form or another elsewhere and everywhere in the Universe is high.

The widely-accepted mediocrity principle (Earth is a typical planet) and its reification, the controversial Drake (or Sagan) Equation usually predicts the existence of thousands of Alien civilizations - though only a vanishingly small fraction of these are likely to communicate with us.

But, if this is true, to quote Italian-American physicist Enrico Fermi: "where are they?" Fermi postulated that ubiquitous technologically advanced civilizations should be detectable - yet they are not! (The Fermi Paradox).

This paucity of observational evidence may be owing to the fact that our galaxy is old. In ten billion years of its existence, the majority of Alien races are likely to have simply died out or been extinguished by various cataclysmic events. Or maybe older and presumably wiser races are not as bent as we are on acquiring colonies. Remote exploration may have supplanted material probes and physical visits to wild locales such as Earth.

Aliens exist on our very planet. The minds of newborn babies and of animals are as inaccessible to us as would be the minds of little green men and antenna-wielding adductors. Moreover, as we demonstrated in the [previous chapter](#), even adult human beings from the same cultural background are as aliens to one another. Language is an inadequate and blunt instrument when it comes to communicating our inner worlds.

Argument Number 2: Their technology is too advanced

If Aliens really want to communicate with us, why would they use technologies that are incompatible with our level of technological progress? When we discover primitive tribes in the Amazon, do we communicate with them via e-mail or video conferencing - or do we strive to learn their language and modes of communication and emulate them to the best of our ability?

Of course there is always the possibility that we are as far removed from Alien species as ants are from us. We do not attempt to interface with insects. If the gap between us and Alien races in the galaxy is too wide, they are unlikely to want to communicate with us at all.

Argument Number 3: We are looking in all the wrong places

If life is, indeed, a defining feature (an extensive property) of our Universe, it should be anisotropically, symmetrically, and equally distributed throughout the vast expanse of space. In other words, never mind where we turn our scientific instruments, we should be able to detect life or traces of life.

Still, technological and budgetary constraints have served to dramatically narrow the scope of the search for intelligent transmissions. Vast swathes of the sky have been omitted from the research agenda as have been many spectrum frequencies. SETI scientists assume that Alien species are as concerned with efficiency as we are and, therefore, unlikely to use certain wasteful methods and frequencies to communicate with us. This assumption of interstellar scarcity is, of course, dubious.

Argument Number 4: Aliens are too alien to be recognized

Carbon-based life forms may be an aberration or the rule, no one knows. The diversionist and convergionist schools of evolution are equally speculative as are the basic assumptions of both astrobiology and xenobiology. The rest of the universe may be populated with silicon, or nitrogen-phosphorus based races or with information-waves or contain numerous, non-interacting "shadow biospheres".

Recent discoveries of extremophile unicellular organisms lend credence to the belief that life can exist almost under any circumstances and in all conditions and that the range of planetary habitability is much larger than thought.

But whatever their chemical composition, most Alien species are likely to be sentient and intelligent. Intelligence is bound to be the great equalizer and the Universal Translator in our Universe. We may fail to recognize certain extragalactic races as life-forms but we are unlikely to mistake their intelligence for a naturally occurring phenomenon. We are equipped to know other sentient intelligent species regardless of how advanced and different they are - and they are equally fitted to acknowledge us as such.

Even so, should we ever encounter them, aliens are likely to strike as being childish and immature. Inevitably, they will find our planet strange. They will experience a learning curve (perhaps even a lengthy one). [Similar to infants](#), they are likely to wander around, tumbling and gaping and clumsily reaching for objects, mute and possibly blinded by the light. They may be hampered by any number of things: gravity, the level of oxygen, radiation, and winds. Far from being a threat, at first they may require our assistance merely to survive the ordeal.

Argument Number 5: We are failing to communicate with Aliens

The hidden assumption underlying CETI/METI (Communication with ETI/Messaging to ETI) is that Aliens, like humans, are inclined to communicate. This may be untrue. The propensity for interpersonal communication (let alone the inter-species variety) may not be universal. Additionally, Aliens may not possess the same sense organs that we do (eyes) and

may not be acquainted with our mathematics and geometry. Reality can be successfully described and captured by alternative mathematical systems and geometries.

Additionally, we often confuse [complexity or orderliness with artificiality](#). As the example of quasars teaches us, not all regular or constant or strong or complex signals are artificial. Even the very use of language may be a uniquely human phenomenon - though most xenolinguists contest such exclusivity.

Moreover, as Wittgenstein observed, language is an essentially private affair: if a lion were to suddenly speak, we would not have understood it. Modern verificationist and referentialist linguistic theories seek to isolate the universals of language, so as to render all languages capable of translation - but they are still a long way off. Clarke's Third Law says that Alien civilizations well in advance of humanity may be deploying investigative methods and communicating in dialects undetectable even in principle by humans.

Argument Number 6: They are avoiding us

Advanced Alien civilizations may have found ways to circumvent the upper limit of the speed of light (for instance, by using wormholes). If they have and if UFO sightings are mere hoaxes and bunk (as is widely believed by most scientists), then we are back to Fermi's "where are they".

One possible answer is they are avoiding us because of our misconduct (example: the alleged [destruction of the environment](#)) or because of our traits (for instance, our innate belligerence). Or maybe the Earth is a galactic wildlife reserve or a zoo or a laboratory (the Zoo hypothesis) and the Aliens do not wish to contaminate us or subvert our natural development. This falsely assumes that all Alien civilizations operate in unison and under a single code (the Uniformity of Motive fallacy).

But how would they know to avoid contact with us? How would they know of our misdeeds and bad character?

Our earliest radio signals have traversed no more than 130 light years omnidirectionally. Our television emissions are even closer to home. What other source of information could Aliens have except our own self-incriminating transmissions? None. In other words, it is extremely unlikely that our reputation precedes us. Luckily for us, we are virtual unknowns.

As early as 1960, the implications of an encounter with an ETI were clear:

"Evidences of its existence might also be found in artifacts left on the moon or other planets. The consequences for attitudes and values are unpredictable, but would vary profoundly in different cultures and between groups within complex societies; a crucial factor would be the nature of the communication between us and the other beings. Whether or not earth would be inspired to an all-out space effort by such a discovery is moot: societies sure of their own place in the universe have disintegrated when confronted by a superior society, and others have survived even though changed. Clearly, the better we can come to understand the factors involved in responding to such crises the better prepared we may be."

(Brookins Institute - Proposed Studies on the Implications of Peaceful Space Activities for Human Affairs, 1960)

Perhaps we should not be looking forward to the First Encounter. It may also be our last.

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Anthropic Agents and the Increase of Entropy (Abstract Only)

The Complexity of Simplicity
And Technical Note about Ambiguity and Vagueness

The Basic Dilemma of the Artist

Turing Machines and Universes

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